Environment Canada Environnement

Canada/Ontario Flood Damage Reduction Program
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CANADA / ONTARIO FLOOD DAMAGE REDUCTION PROGRAM

EVALUATION REPORT

March 31, 1991

Environment Canada Environnement Canada

Ontario Ministry of Natural Resources Ministère des Richesses naturelles

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Environment Canada Environnement Canada

Ministry of Natural Resources Ministère des Richesses naturelles

Ontario

CANADA/ONTARIO FLOOD DAMAGE REDUCTION PROGRAM

The Honourable Robert R. de Cotret
Minister
Environment Canada
Ottawa, Ontario

The Honourable Bud Wildman
Minister
Ontario Ministry of Natural Resources
Toronto, Ontario

Dear Ministers,

The Steering Committee for the Canada/Ontario Flood Damage Reduction Program, is pleased to submit this Evaluation Report. The report outlines and assesses work conducted under the Program between March 31, 1978 and the present. The Agreement provides for a program of flood risk mapping including studies totalling 17.6 million dollars and will terminate on March 31, 1992.

In 1978, the Governments of Canada and Ontario entered into an agreement to provide flood hazard studies and mapping to assist conservation authorities and municipalities in identifying flood risk areas. This approach provides for the regulation of new development in these areas. Informing the public about local flood hazards has also been one of the strategies utilized in the program. The purpose of these actions is to reduce flood damages and diminish the need for flood disaster assistance.

Areas identified as being in high/imminent risk of flood damages were addressed as a first priority. The Great Lakes shorelines experienced significant damages due to flooding and erosion caused by record high water levels of 1985-86. The Canada/ Ontario Flood Damage Reduction Program was therefore expanded in 1986 to include mapping of Great Lakes shorelines.

The program has actively promoted and exemplifies the principles of sustainable development by encouraging development to occur outside of flood risk areas. Analysis has confirmed that where engineering studies, and hazard land mapping have been completed and implemented through municipal planning documents, the potential future long-term public cost of damages and social disruption associated with riverine and shoreline flooding is significantly reduced. An added benefit is that flood plains are left in a natural state for present and future generations to enjoy.

Federal, provincial and municipal governments, and conservation authorities have participated in program implementation including public consultation, providing an excellent example of successful partnership arrangements. Over 400 municipalities, 36 conservation authorities and all regional MNR offices have participated in flood plain mapping and other measures studies undertaken through the program. Mapping studies have been subjected to public review and consultation.

The Canada/Ontario Flood Damage Reduction Program has many achievements. The program has assisted in developing a flood plain management program in Ontario, through the provision of flood risk mapping and other flood damage reduction studies. The delivery of an effective flood plain management strategy in Ontario is a part of the committment to ensure that property damages and risk to loss of life are minimized. All governments should take note of these areas that have been identified as flood and erosion prone, to ensure that development is directed towards other areas and that we indeed do not repeat the past history of flood damages in the future.

Doug Cuthbert
Federal Member,
Steering Committee

Maurice G. Lewis
Chairperson,
Steering Committee

Hans Foerstel
Federal Member,
Steering Committee

Phyllis Miller
Provincial Member,
Steering Committee

TABLE OF CONTENTS

Letter of Acknowledgment			i
1.	**INTRODUCTION**		3
2.	**OVERVIEW OF THE PROGRAM**		5
	2.1	*History of the Program*	5
	2.2	*Program Administration*	6
3.	**PROGRAM ACHIEVEMENTS**		8
	3.1	*Designations*	8
	3.2	*Riverine Flood Risk Mapping*	8
	3.3	*Great Lakes - St. Lawrence River Shoreline Flood and Erosion Risk Mapping*	8
	3.4	*Public Information*	11
	3.5	*Special Policy Areas*	11
	3.6	*Other Flood Damage Reduction Measures*	12
4.	**PROGRAM EXPENDITURES**		14
5.	**CLIENT EVALUATION**		16
	5.1	*Government Agencies*	17
	5.2	*Great Lakes Shoreline Property Owners*	17
6.	**CONCLUDING STATEMENT**		18

TABLE OF CONTENTS

LIST OF FIGURES

Figure 1:	Administrative Procedures	7
Figure 2:	Southern Ontario - Designations	9
Figure 3:	Northern Ontario - Designations	10
Figure 4:	Annual Expenditures by Program Component	15
Figure 5:	Total Program Expenditures by Component	15

1. INTRODUCTION

The objective of this evaluation report is to assess the overall effectiveness of the Program as evidenced through program accomplishments, improvements in program administration, effectiveness of implementation mechanisms, product value and benefits realized by federal, provincial and municipal partners and the public at large.

Beyond assessing current program achievements, answers to the above questions will assist federal and provincial partners in making informed decisions regarding the future direction of the Program.

In 1975 the federal Cabinet, under the Canada Water Act, approved the establishment of the National Flood Damage Reduction Program. The objective of this Program was to enter into partnerships with all provinces having areas of recognized potential for flood damage. Through these partnership agreements, federal and provincial governments would agree to formulate policies to reduce flood damage and risk of loss of life by discouraging new development in flood hazard areas.

Since 1976 agreements have been signed with all provinces and territories except Prince Edward Island and the Yukon Territory. The Province of Ontario signed a partnership agreement in 1978 with Environment Canada identified as the lead federal department and the Ontario Ministry of Natural Resources identified as the provincial agency responsible for program implementation.

The need to establish programs to address riverine flooding in the Province of Ontario first gained recognition following widespread flooding in southern Ontario in the late 1930s. The initiation and strengthening of the conservation authorities movement which followed, coupled with the disastrous flooding and loss of life in the wake of Hurricane Hazel in October 1954 led to the establishment of a provincial flood plain management program to address riverine flooding.

The provincial riverine flood plain management program consisted of three main components: prevention, protection and emergency response. During the 1940s and 1950s, the Province, separately and in partnership with the federal government, concentrated on the construction of flood control structures such as dams, diversions, dykes and channelization works. In the 1960s and 1970s, work continued on structural measures but emphasis began to shift to the preventative approach of flood plain management. In the 1980s and 1990s, this emphasis has continued and has been placed on developing standards to define flood susceptible riverine environments, on establishing regulations to control and re-direct new development to less hazardous areas, on developing emergency response plans and on establishing disaster relief and assistance programs. All these actions have proven to provide a more cost effective long-term benefit to the community and governments overall.

Similarly, the provincial shoreline management program was established in response to damages sustained during the high water levels of 1985-87 on the Great Lakes - St. Lawrence River system.

The Canada/Ontario Flood Damage Reduction Program provided a unique opportunity for the delineation and mapping of flood susceptible riverine and shoreline environments, for promoting technology development, and for encouraging a heightened public awareness and support of flood plain management programs. This in turn has assisted all levels of government in collectively reducing the long-term costs due to flooding such as loss of life, property damage and social disruption.

2. OVERVIEW OF THE PROGRAM

The basic objective of the Canada/Ontario Flood Damage Reduction Program is to reduce the risk of loss of life and property damage due to flooding.

Achievement of this objective is realized through a three step approach of identification of flood hazards, mapping and designation of the flood hazard areas, and implementing governing policies. These policies come into effect upon the signed approval or "designation" of the flood and erosion risk maps by the federal and provincial ministers on behalf of their respective governments, which means that:

- no future federal or provincial government buildings or structures that are vulnerable to flood damage will be located in the designated flood risk areas;

- financial assistance from government sources, such as the Canada Mortgage and Housing Corporation, will no longer be available for new buildings or structures placed in the designated flood risk areas;

- any buildings or structures vulnerable to flood damages placed in the flood risk area after designation will not be eligible for flood disaster assistance; and

- the two governments will encourage local municipalities to adopt land use restrictions to control development in flood risk areas.

In the interests of promoting commitment and informed decision making at the local level, the Steering Committee for the Program has required that a municipal resolution from affected municipalities be obtained prior to the initiation of each project. The purpose of these municipal resolutions was to endorse and indicate an understanding of the policies of the Program.

2.1 History of the Program

Initiated in 1976, the first five year agreement between the federal and provincial governments was signed in 1978 and consisted of a flood risk mapping ($8 million) and other flood damage reduction measures ($1.2 million) components.

Subsequent revisions and amendments to the initial Agreement were required due to major reviews of provincial flood plain policies, the need for increased funding, and extensions in time to permit efficient and effective expenditure of allocated funds.

- ***Revision in November 1982***

  A major review of the provincial flood plain management policies in the first three years of the Program resulted in less than anticipated expenditures, necessitating an extension of time, to allow the incorporation of the two-zone flood-fringe floodway concept and acknowledgement of revised provincial policies in the Agreement.

- *Amending Agreement No. 1, November 1985*

  Increasing development pressure and flood damages substantiated an increase in funding levels for mapping by $7.4 million to a total of $15.4 million and for other measures studies by $1.0 million to a total of $2.2 million; and time extensions for mapping to March 31, 1990, for other measures studies to March 31, 1992 and for the policies of the Program to March 31, 1995. A list of specific communities and watercourses requiring flood risk mapping was also added to the Agreement.

- *Amending Agreement No. 2, May 1990*

  Two year extension in time only and a transfer of funds from the other measures to the mapping component to permit expenditure of allocated funds and completion of mapping projects by March 31, 1992.

The evolution and enhancement in the areas of fiscal management and cooperative administration of the Canada/Ontario Flood Damage Reduction Program would suggest it to be one of the better examples of federal/provincial partnership. In addition, this Program can be considered a model for the principle of sustainable development.

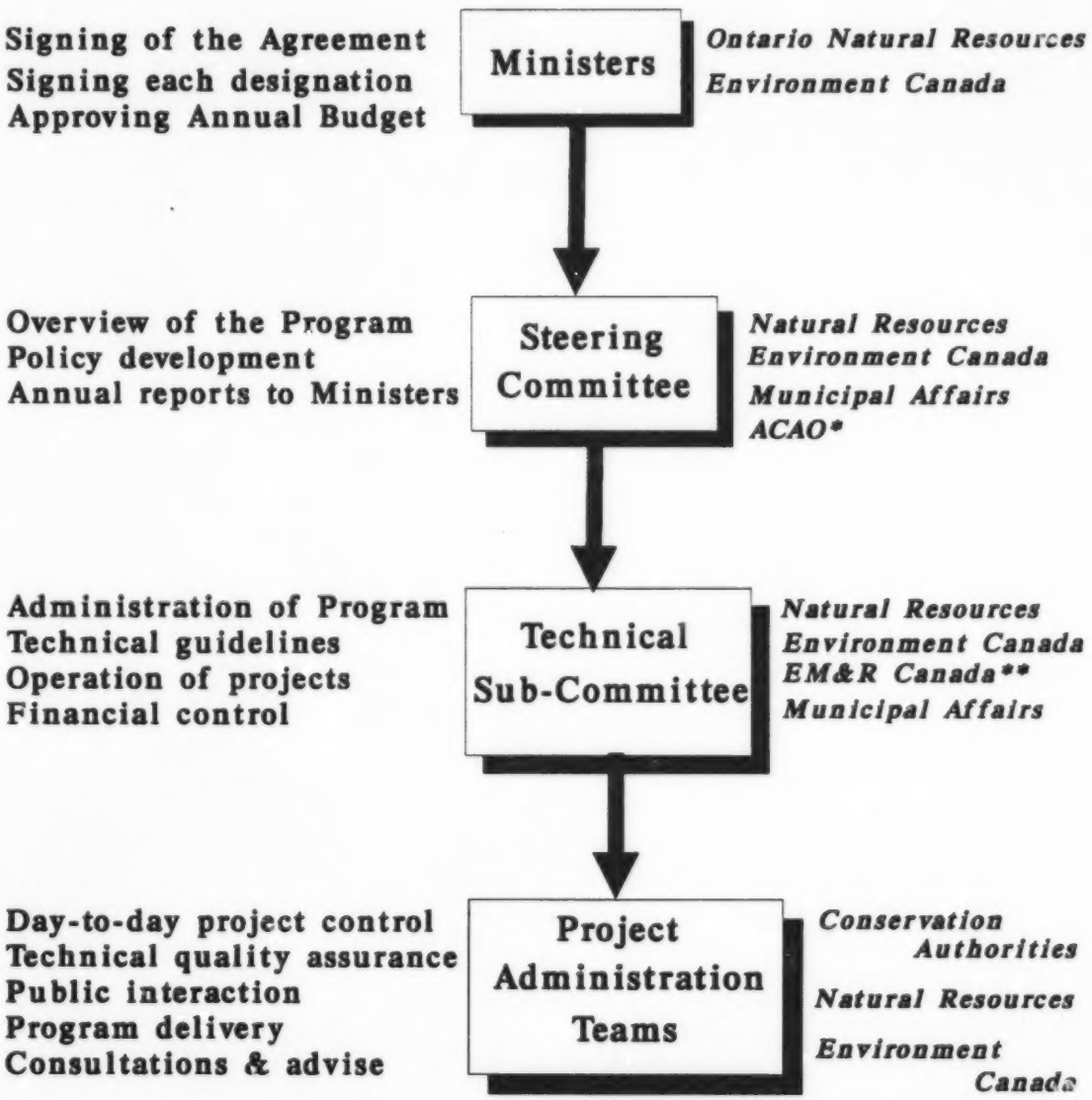
2.2 *Program Administration*

The Canada/Ontario Flood Damage Reduction Program is administered by a Steering Committee, consisting of two federal and two provincial members (see figure 1). The Steering Committee is responsible for policy, procedures and budgetary aspects of program administration. The Committee may act on behalf of the federal Minister of Environment Canada and the provincial Minister of Natural Resources (MNR) in the implementation of the Program.

The Technical Sub-Committee assists the Steering Committee and provides technical leadership in the administration of the Program, advice and support to project teams and program staff to carry out specific duties in the implementation of the Program.

Project teams usually consist of a chairperson from either the local conservation authority or municipality, an Environment Canada representative and a MNR representative. Project teams co-ordinate and facilitate prompt multi-agency review and decision on mapping projects and studies; they provide a single contact for consultants and mapping firms; and monitor and supply technical quality control on individual projects and ensure accuracy of completed projects.

Administrative Procedures
Canada/Ontario FDR Program



* Association of the Conservation Authorities of Ontario
** Energy, Mines and Resources Canada

Figure 1

3. PROGRAM ACHIEVEMENTS

The information generated through the Canada/Ontario Flood Damage Reduction Program has provided a direct and significant contribution in the Province of Ontario, promoting a coordinated approach to land use planning and water management, in the regulation of new development and in reducing the potential future costs associated with flood damages.

3.1 Designations

Over the period of the Agreement which will end March 31, 1992, 174 watercourses and portions of the Great Lakes - St. Lawrence River shoreline will have been designated, affecting 442 cities, municipalities, townships or towns (see figures 2 and 3). In addition, interim designations for 11 riverine areas, representing 9 communities, mapped outside of the Program but which meet the requirements of the Program will have been completed by March 1992. Within each of these areas, the policies of the Program will be implemented with the signing of the interim designations by the respective ministers. To date, only two municipalities have declined to participate in the Canada/Ontario Flood Damage Reduction Program.

3.2 Riverine Flood Risk Mapping

The major achievement of the Program has been in riverine flood risk mapping. The Program has funded and mapped approximately 3840 square kilometres of riverine areas or more than 3600 kilometres of river and stream length.

By March 1992, the Program will have completed mapping for portions of 154 watercourses in 332 flood vulnerable communities. A total of 445 watercourses were identified in Schedule A of the Agreement as requiring flood risk mapping.

3.3 Great Lakes - St. Lawrence River Shoreline Flood and Erosion Risk Mapping

Extensive property damages sustained during the high water levels of 1985-87 prompted a shift in Program mandate to include the preparation of flood and erosion risk maps for the shorelines of the Great Lakes - St. Lawrence River system. By March 1992 approximately 700 kilometres of shoreline encompassing 290 square kilometres in 110 cities, municipalities, townships or towns will be mapped (see figure 2).

In the interest of promoting additional long-term benefits, the Program shifted from conventional to digital map products for the shoreline program. In addition to taking advantage of new technology, this shift will enable the Program to investigate information with geographical information systems (GIS) technology, reduce future costs in updating digital map databases, and contribute to and participate in new cooperative programs in digital and/or GIS technology.

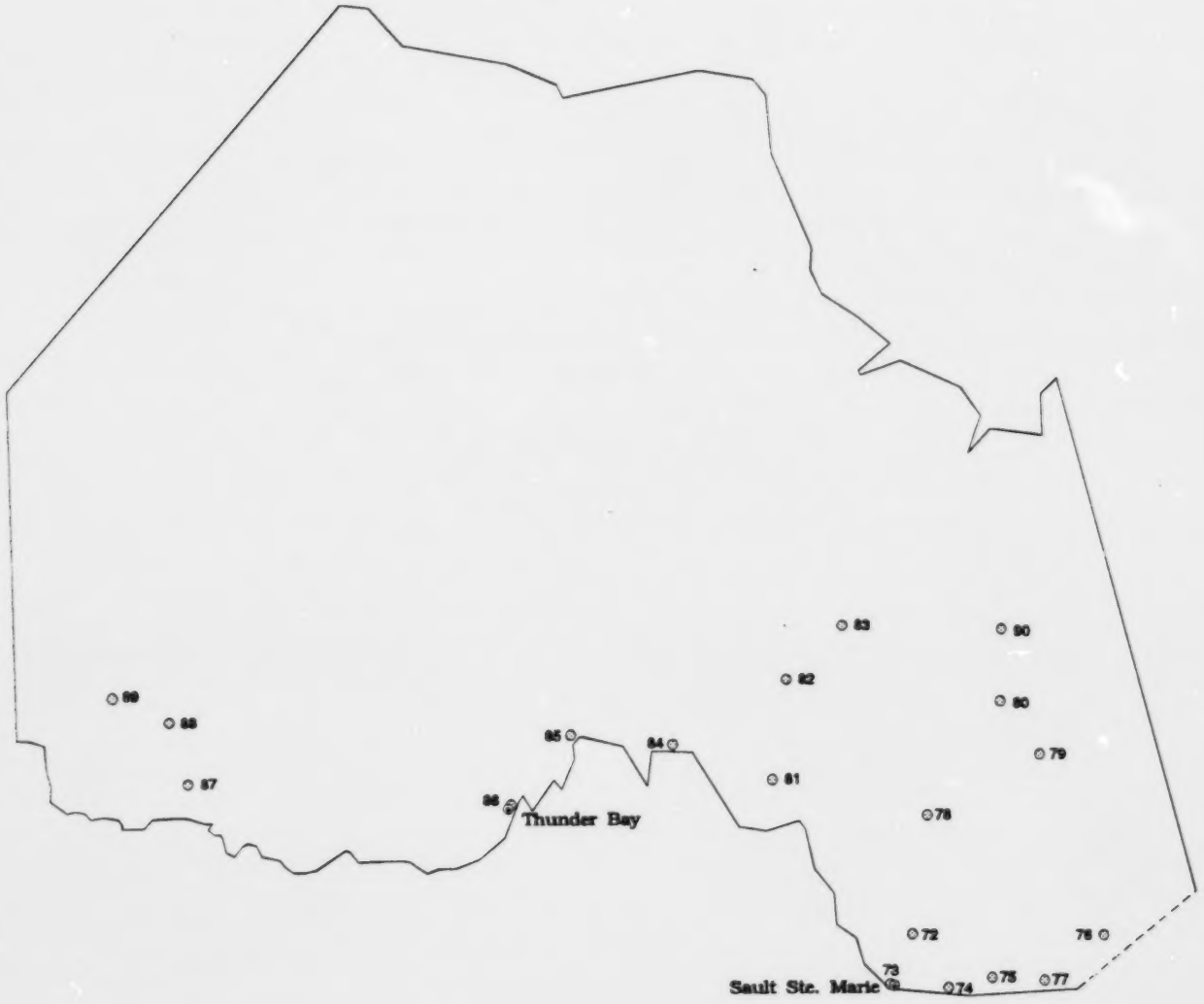
Southern Ontario Designations

Shoreline Mapping

Riverine Designations

Figure 2

Northern Ontario Designations



Riverine Designations ○

Figure 3

3.4 Public Information

Public awareness has led to understanding and support for the governing objectives and policies of the Program. This has greatly enhanced the level of Program achievement. Mechanisms used by the Program to enhance public participation include the preparation of detailed flood risk maps, public information maps, interpretive publications on flood and erosion hazards, and the joint hosting of public meetings and open houses with local implementing agencies.

Some accomplishments of the public information component of the Program include:

- 150 public information flood risk maps
- 110 jointly hosted open houses
- Publication of the following items
  - Cutting our Flood Risk Losses brochure
  - A New Approach to an Old Problem brochure
  - Catalogue of Flood Risk Mapping in the Province of Ontario
  - Flood News and Views Newsletter
  - Advertising posters for open houses
- Development of an automated slide show and video - "Cutting our Flood Risk Losses"
- Financial contribution to National Film Board of Canada - production of the animated film entitled 'Splash'

All publications and videos were made available to the conservation authorities, municipalities, government agencies and the public.

Public information flood risk mapping was not completed for 24 riverine and 16 shoreline projects due to funding and time limitations.

3.5 Special Policy Areas

The Provincial Flood Plain Planning Policy Statement defines special policy area as an area within a community that has historically existed in the flood plain and where strict adherence to certain Province-wide policies restricting new development would result in severe social and economic hardships for the community. As a result site specific policies are formulated and applied within the defined limits of the special policy area. The concept of special policy areas (SPAs) provides additional flexibility in the implementation of the provincial flood plain management program by recognizing the existence of historical development in a flood risk area.

The Steering Committee developed procedures for recognizing SPAs. For provincially approved SPAs where the level of flood proofing protection is at or above the 100-year flood, designation approval under FDRP was delegated to the

Assistant Deputy Minister for Environment Canada and to the Assistant Deputy Minister, Policy Division, for the Ministry of Natural Resources (formerly the Executive Director of the Lands and Waters Group). Provincial SPAs requiring flood protection below the 100 year level flood would be referred to the respective ministers for their concurrence under FDRP. To date five SPAs, located in and around Toronto, are registered by the Program. The level of protection provided in these SPAs is the 350 year flood or greater.

3.6 Other Flood Damage Reduction Measures

Through these studies the Program has provided leadership in the development, transfer and application of flood and erosion hazard management techniques and technology provincially, nationally and internationally. The following studies have been completed to date at a cost of $1.4 million dollars:

- Ontario Flood History The Water Network, 1991.
- Guidelines for Floodway Flood Fringe Analysis S.M.A. Moin, Environment Canada, 1991 (draft).
- Hydrograph Parameter Study for Ontario Watersheds S.M.A. Moin and M.A.Shaw, Environment Canada, 1991 (draft).
- Alternative Flood Plain Mapping Techniques study Queen's University, 1990.
- Benefit/Cost Analysis of Selected Projects under the Canada/Ontario Flood Damage Reduction Program Wilfred Laurier University, 1990.
- Areal Snow Accumulation-Ablation Model (ASAAM) Grand River Conservation Authority, 1989.
- Grand River Integrated Food Forecast System (GRIFFS) Grand River Conservation Authority, 1989.
- Ice Jam Flood Frequency Study MacLaren Plansearch, 1989.
- Remote Sensing for Flood Forecasting Study University of Waterloo, 1989.
- Goulais River Flood Damage Reduction Survey, v.1-4 Kresin Engineering and Planning, 1988.
- Report on the Categorization of Watersheds for Operational Flood Forecasting Marshall Macklin Monaghan, 1988.
- Report on Lake Superior Shore Property Damage Economic Evaluation Marshall Macklin Monaghan, 1988.
- Definition Study of Floodway Flood Fringe for Riverine and Lake Flooding MacLaren Plansearch, 1987.

- Examination and Development of the Antecedent Precipitation Index (API) Method for Runoff Prediction in Ontario MacLaren Plansearch, 1987.

- Regional Flood Frequency Analysis for Ontario Streams v. 1-3 S.M.A. Moin and M.A. Shaw, Environment Canada, 1986.

- Development of Flood Depth-Damage Curves for Residential Homes in Ontario Paragon Engineering Limited, 1985.

- Water Management Improvement Study of the Muskoka River System MacLaren Plansearch, 1985.

- White River Flood Control Works Proctor and Redfern, 1982.

- Flood Reduction Study of the Sturgeon River/Lake Nippissing/French River System v.1-3 MacLaren Plansearch, 1981.

4. PROGRAM EXPENDITURES

Expenditures incurred throughout Program implementation were shared equally between the federal and provincial governments. The provincial government subsequently required that conservation authorities and local municipalities contribute financially to project costs. Funding arrangements for projects administered through the Program were as follows:

- ***Riverine/shoreline mapping studies:***
  - Federal - 50%, Provincial - 40%, CA or municipality - 10%
- ***Other measures studies:***
  - Federal - 50%, Provincial - 50%
- ***Program administration, inspection, quality control, audits:***
  - Federal - 50%, Provincial - 50%

The Province acted as Program banker, front-ending funding for all studies and projects. The annual expenditures by program component are shown in figure 4. These expenditures were incurred largely by conservation authorities and municipalities on behalf of the Steering Committee. The Province provided invoices to Environment Canada and received federal reimbursements less any Program related expenditures incurred by the federal government.

Total expenditures by Program component (Figure 5) highlight several points. First, the significant focus, 82% in total funding, placed on the preparation of mapping within riverine and shoreline areas. Second, the contribution and leadership in technology development and transfer promoted by the Program which accounted for 7% of total funding. Third, the expenditure of 3% of Program funding for public information resulting in heightened Program profile and measurable returns in public support. Administration costs, which includes funding required for quality control, inspection, auditing, public information maps and cartography, and overall program supervision, amounts to 8% of the total funding allocation. Administration costs increased in the last 4 years of the Program primarily due to inspection costs associated with digital shoreline mapping initiatives on the Great Lakes. These costs were incurred by Energy, Mines and Resources Canada and the Ontario Ministry of Natural Resources, Land Resources Information Branch. In previous years these costs were included in the engineering component of riverine flood plain mapping studies undertaken by consultants.

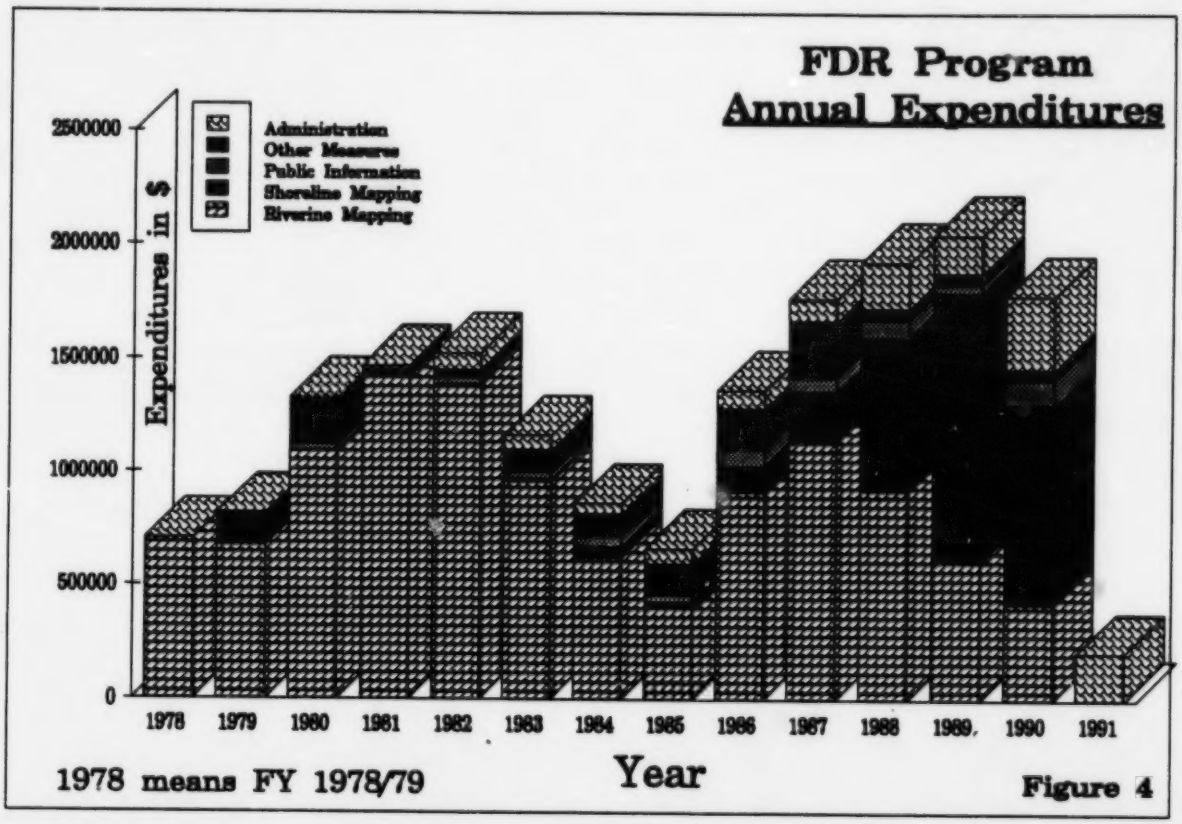


Figure 4

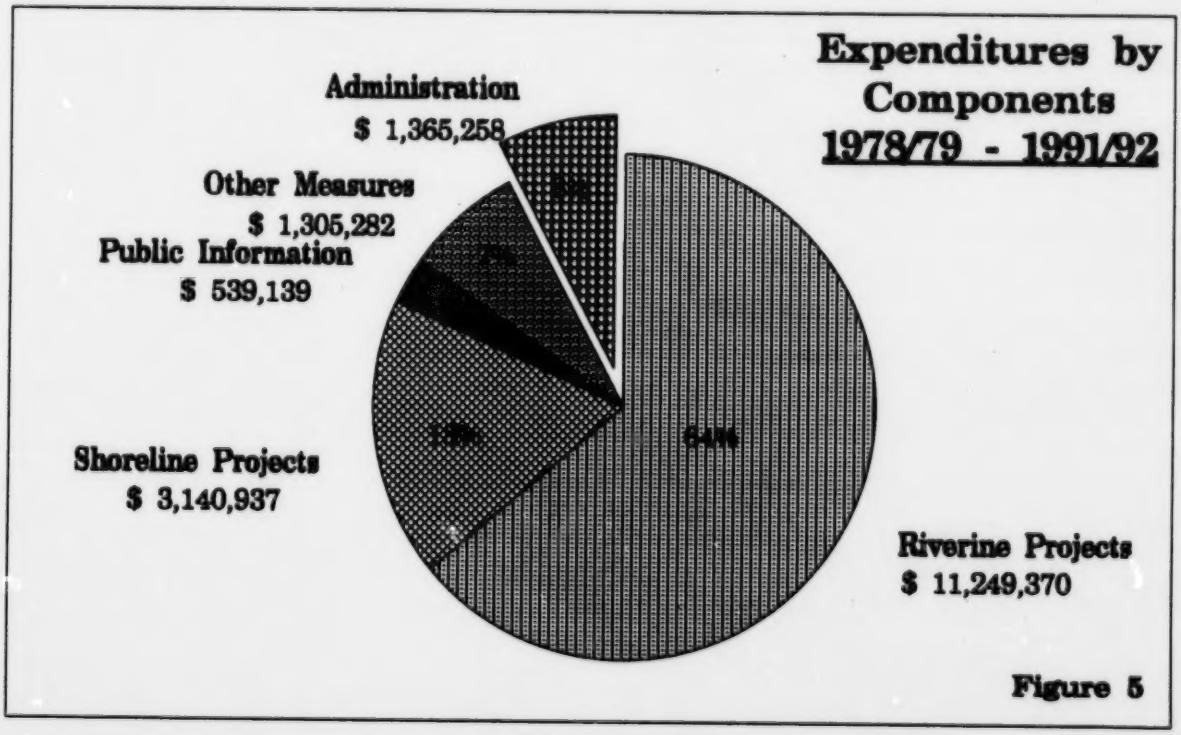


Figure 5

5. CLIENT EVALUATION

Two questionnaires were developed to measure Program success from various client groups. One was forwarded to government agencies, benefitting municipalities and conservation authorities and the other to target agencies such mapping and engineering contractors and consultants, and the end-users of Program products and information. Since the latter survey generated a statistically insufficient response (5 responses out of 47 requests), the results have not been incorporated in the evaluation.

5.1 Government agencies

Insight into government agencies' opinions of Program value and benefit was obtained through the circulation of a detailed questionnaire. Of the 121 questionnaires circulated, 59 agencies or 49% provided responses ensuring a high significance rating for any conclusions derived from an analysis of responses. Of those responding agencies, 51% were conservation authorities, 27% were provincial agencies, 17% were federal agencies, with the remaining 5% consisting of other government agencies.

Comments addressing several key aspects of Program administration were provided including those on:

- ***Awareness of the Program***
  - 91% were aware of the Program, the strongest awareness being among conservation authorities and federal agencies
  - use of information briefings (57%) and the receipt of public information maps (45%) were the most common sources of contact

- ***Need for Flood Risk Mapping***
  - 95% supported the mapping program and indicated a correspondingly strong need for mapping within their jurisdiction
  - 87% indicated a need for continued production of flood/erosion risk maps
  - areas of strongest need included riverine areas (98%) and Great Lakes shorelines (90%), with an increasing need for mapping around large inland lakes (65%)

- ***Use of Flood/Erosion Risk Mapping in the Planning/Development Process***
  - 75% regularly used the maps produced under the Program
  - 86% used the information generated through the Program in the planning and development review process
  - 74% used them as a source of general public information
  - 84% were aware of and promoted Program policies to not fund development in designated flood/erosion risk areas

- ***Implementation of Program policies***
  - 75% indicated ability to implement policies through agency regulations, 25% through zoning, and 11% through the control of funding allocations

- *General comments on overall program implementation*
  - overwhelming 94% of responding conservation authorities supported and encouraged the continuation of the Program
  - one consistent criticism related to the bureaucracy of having two committees (ie. Steering Committee and Technical Sub-Committee), was suggested that a single administrative/technical committee would significantly reduce time delays in approval processes
  - strong, consistent support for Program leadership in standardizing mapping and hydrotechnical procedures, and in quality control
  - two conservation authorities advocated an increase in their share of funding contributions to more accurately reflect benefit
  - majority of conservation authorities recommended increasing funding levels to ensure more timely completion of mapping projects for high/imminent risk areas

In conclusion, the Program has been seen as providing an excellent opportunity to:

- demonstrate the viability and success of joint federal/provincial initiatives where common goals are desired. To this end, the Program can serve as a model for other federal/provincial ventures of mutual benefit.

- promote a "pooling" of technical expertise having the common objective of developing high calibre standards and procedures, activities which streamlined and significantly enhanced the quality of Program products.

- encourage consistent and effective application of technically sound flood and erosion management policies and principles across political and jurisdictional boundaries.

5.2 *Great Lakes Shoreline Property Owners*

An additional source of insight into public perceptions and attitudes of the Program can be gained from an extensive survey of shoreline residents undertaken in 1990 as part of the current International Joint Commission Reference on Great Lake Water Levels.

- On the question of governments producing public maps of flood and erosion prone areas, approximately 82% (10,822 out of 13,235) of respondents were in favour. This suggests strong support and need for an enhanced public information program. When questioned on possible funding sources, 25% favoured funding by the federal government, 48% endorsed funding from all levels of government, and another 25% preferred a cost sharing arrangement among benefitting interests.

- On the question of government policies and regulations requiring new development to be located a safe distance from the water's edge, 73% indicated support. In addition, 76% supported an increased role and effort by governments in providing forecasts of water levels.

6. CONCLUDING STATEMENT

The success of the Program can be attributed in large part to the effective partnership arrangements with the participating agencies. Conservation authorities, municipalities, Environment Canada, Energy, Mines and Resources Canada, Ontario Ministry of Natural Resources and the Ontario Ministry of Municipal Affairs all played a vital role in program delivery. These agencies, working together, have ensured that sound and sustainable flood plain management practices are firmly established in the Province of Ontario. A lot has been done and there is reason to be excited about the accomplishments of the Canada/Ontario Flood Damage Reduction Program.

Flood plain mapping in the Province of Ontario must continue. Additional areas have to be mapped and in other areas the mapping needs to be updated. It is also essential that the information and technology developed over the past 13 years continue to be communicated to public agencies and to governments to promote awareness and understanding of flood damage reduction principles. Consideration should be given to a further Canada/Ontario Flood Damage Reduction Program directed towards achieving these objectives.